



17W 2621

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Atty. Docket

Marcel BREEUWER

NL000693

Serial No.: 10/014,184

Group Art Unit: 2621

Filed: DECEMBER 11, 2001

Ex.: Tom Y. LU

METHOD OF VISUALIZING THE PERFUSION OF AN ORGAN WHILE  
UTILIZING A PERFUSION MEASUREMENT

BOX PETITIONS

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

PETITION TO REVIVE

Sir:

It is the Applicant's understanding that the above-identified application is technically abandoned, although no Notice of Abandonment has been received, and none has been issued by the USPTO to date. Applicant respectfully requests this application be revived for the following reasons:

Attached to this Petition are copies of the Petition for Extension of Time, Amendment and Request to make Drawing Amendments, mailed on March 30, 2005, as well as a return-receipt post card noting receipt by the USPTO of said documents on April 4, 2005.

Applicants believe that there is no fee for this  
Petition, but the Commissioner is hereby authorized to charge  
any fees in connection with this Petition to Deposit Account  
No. 14-1270.

Respectfully submitted,

  
By \_\_\_\_\_  
John Vodopia, Reg. 36,299  
Attorney  
(914) 333-9627

**Enc: Copy of Extension of Time mailed March 30, 2005**  
**Copy of Amendment mailed March 30, 2005**  
**Copy of Request to Make Drawing Amendment With 3 sheets of**  
**informal drawings mailed March 30, 2005**  
**Copy of Return-Receipt Post Card With USPTO Receipt of**  
**April 4, 2005**

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On 09/06/2005  
(Mailing Date)

By G Lamprecht  
(Signature)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of  
MARCEL BREEUWER  
Serial No. 10/014,184



Atty. Docket  
NL 000693  
Group Art Unit: 2621  
Ex. Tom Y Lu

Filed: December 11, 2001

Title: METHOD OF VISUALIZING THE PERFUSION OF AN ORGAN WHILE  
UTILIZING A PERFUSION MEASUREMENT

AMENDMENT

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

In response to the Office Action mailed November 30, 2005, in the above-identified application, the time for responding to which being extended one month by the accompanying Petition For Extension Of Time, applicant provides the following amendments and remarks.

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P.O. BOX 1450  
ALEXANDRIA VA 22313-1450

On March 30 2005  
(Mailing Date)

By [Signature]  
(Signature)

PG APR 14 2005

## IN THE SPECIFICATION

Please make the following changes to the specification beginning at the first paragraph of page 3.

The invention will be described in detail hereinafter on the basis of ~~a non-limitative~~ examples of a preferred version of the method in accordance with the invention and with reference to the following drawing figures 1-4 with a single diagrammatic Figure.

Fig. 1 is a pictorial representation of a process of the invention, where a pair of time successive images are processed to calculate transformation parameters and to implement transformation parameters;

Fig. 2 is a pictorial representation of a display device displaying a region of interest in a first image of a sequence depicting a slice of a cardiac organ under perfusion investigation;

Fig. 3 is a series of succeeding images in time of a fixed position of a slice of a cardiac organ under investigation; and

Fig. 4 is a data processing system of this invention.

Each time a pair of successive images is selected from a number of images (which number is known or not) that are arranged in series, for example the image  $B_{i-1,r}$  and the subsequent image  $B_{i,o}$ . The image  $B_{i-1,r}$  bears the sequence number  $i-1$  and is formed from an image  $B_{i-1,o}$  that concerns the actual exposure of the organ being examined wherefrom the image has been acquired. Transformation of this image  $B_{i-1,o}$  in conformity with the method of the invention to be described in detail hereinafter yields the transformed image  $B_{i-1,r}$ . A reference region  $ROI_{i-1}$  is defined in the image  $B_{i-1,r}$ . This operation can be performed manually or automatically. The organ being examined should be situated completely within the region that is indicated by the reference  $ROI_{i-1}$ ; the boundary of the reference region  $ROI_{i-1}$  that is denoted by the dashed line marks the immediate vicinity of the organ being examined.

An image  $B_{i,r}$  that succeeds the image  $B_{i-1,r}$  and bears the sequence number  $i$  is then determined as follows. This operation is based on an image  $B_{i,o}$  that succeeds a previous image  $B_{i-1,o}$ , after which a reference region  $ROI_i$  is defined in said image  $B_{i,o}$ , which reference region is bounded in the same way as the reference image  $ROI_{i-1}$  in the image  $B_{i-1,r}$ . The two reference regions  $ROI_{i-1}$  and  $ROI_i$  are subsequently analyzed in an calculation processor ~~organ~~ 1 in order to determine the

degree of rotation and translation of  $ROI_i$  relative to  $ROI_{i-1}$  that is necessary so as to minimize the differences between  $ROI_{i-1}$  and  $ROI_i$  (due to spurious organ motion). To this end, the calculation processor 1 generates and applies a control signal 2 to a transformation processor member 3, which performs a rotation and/or translation on the entire image  $B_{i,o}$  in order to obtain the image  $B_{i,r}$  that can subsequently be presented (based on control signal 2). That is,  $B_{i,o}$ , coming sequentially in time after the image  $B_{i-1,r}$ , is displayed on a the display device 10 for visual inspection (Figs. 2-4). Fig. 2 shows display device 10 depicting  $B_{i-1,o}$ , where  $i = 1$ , or  $B_{0,o}$ . The elements shown in Fig. 2 include a region of interest (ROI0), of the first in a series of images, where ROI0 shows a slice through the myocardium 20 of the right ventricle 30 and left ventricle 40. Perfusion is observed over the time sequence of the image, fixed in space (by the inventive transformational processes) within left ventricular blood pool 50.

During a next step of the operation, the image  $B_{i,r}$  takes the position of the image  $B_{i-1,r}$ , as can be seen readily from the series of images of Fig. 3. That is, Fig. 3 shows that is shown in the Figure, so that the execution of the described method can be repeated for the subsequent image  $B_{i+1,o}$  in order to form the image  $B_{i+1,r}$  in a sequence of images, fixed and aligned in space, such that changes in the image intensity representative of perfusion is readily seen with minimum distortion due to motion artifacts.

Fig. 4 shows a data processing system 100 including a data processor 110 for carrying out the process of the invention. Data processor 110 includes a port 120 wherein a computer readable medium including a set of instructions for implementing the inventive process using a general purpose computer can be read, the instructions downloaded and the process implemented by data processor 110. The perfusion measurement images are displayed on display device 10.

## IN THE CLAIMS

Please amend the claims as shown in the claims listing which follows, where the listing of pending claims after amendment supercedes all previous claims listings:

1. (Currently amended) A method of visualizing ~~the~~ perfusion of an organ concurrently with implementation of, notably the myocardium of a patient, while utilizing a perfusion measurement process, including steps of:

acquiring in which method a sequence series of images which include a region of interest (ROI) within which a portion of the organ under perfusion investigation is displayed while concurrently implementing of the organ that has been acquired by way of the perfusion measurement; and

implementing is displayed on a display device so as to be visually inspected, characterized in that a transformation operation is performed on every pair of successive images from the series of images of the portion of the organ in the ROI such a manner that subsequent to the transformation operation the organ will be displayed essentially in a fixed position.

2. (Currently amended) A method as claimed in claim 1, wherein ~~characterized in that~~ the first image in time serves as a reference base, and that each of the subsequent images is transformed so as to minimize differences between each of said images and the reference base.

3. (Currently amended) A method as claimed in claim 1, wherein ~~characterized in that~~ the first image in time of every pair of successive images serves as a reference base, and that the subsequent second image of the pair is transformed so as to minimize differences between said second image and the reference base.

4. (Currently amended) A method as claimed in claim 1, wherein ~~characterized in that~~ the transformation operation further includes a step by which a ~~is composed of~~ a rotation operation and a translation operation ~~that are performed on the image.~~

5. (Currently amended) A method as claimed in claim 1, further including that characterized  
~~in that~~ prior to the transformation operation, there is determined a reference region in the image that  
constitutes the reference base, also included ~~and~~ in the subsequent image, and that the transformation  
operation minimizes ~~is determined by minimizing~~ the differences in the reference region of  
successive images.

6. (Currently amended) A method as claimed in claim 5, wherein ~~characterized in that~~ the  
reference image is bounded by the immediate vicinity of the organ being examined by the ROI.

7. (Currently amended) A method as claimed in claim 5, wherein ~~characterized in that~~ the  
transformation operation, as determined by means of the reference region, is performed on the entire  
image.

8. (Currently amended) A data processing system comprising a display device arranged for  
visualizing the perfusion of an organ, ~~notably the myocardium of a patient~~, while implementing  
~~utilizing~~ a perfusion measurement, which includes an ability ~~and~~ to acquire a series of images of the  
organ by way of the perfusion measurement, the ~~display~~ displaying said series of images ~~on the~~  
~~display device so as to be~~ to facilitate visually inspection of the perfusion characteristics of the  
organ as the perfusion measurement is conducted, wherein ~~characterized in that~~ the data processing  
system is arranged to perform a transformation operation ~~is performed~~ on every pair of successive  
images from the series of images of the organ ~~in such a manner that~~ subsequent to the transformation  
operation, the organ will be displayed essentially in a fixed position to effectively visualize  
perfusion.

9. (Currently amended) A computer readable medium which includes a computer program,  
the computer program readily transferable from the medium to a general purpose computer which  
may then implement the computer program to processing a series of images of an organ, the process  
including performing a transformation operation is performed on every pair of successive images  
from the series of images of the organ ~~in such a manner that~~ subsequent to the transformation  
operation, the organ ~~is~~ will be displayed essentially in a fixed position.



### REMARKS

The foregoing amendments were made in response to the outstanding Office Action, mailed from the Patent Office on November 30, 2004, rejecting claims 1-4 and 8 under 35 USC § 112, second paragraph, as indefinite by applicant's use of the term "notably" in claim 1, and "the image" in claim 4. Any other claims amendments are implemented to improve the form of the claims in view of best US Patent Practices; no new matter has been added. Accordingly, applicant respectfully reserves all rights he may have under the Doctrine of Equivalents, and his right to reintroduce subject matter deleted herein at a later time during the prosecution of this application or continuing applications.

A Petition of Extension of Time accompanies the present amendment, which petition extends the time to respond to the outstanding Office Action one month, up to and including March 30, 2005.

A request to make drawing amendments accompanies this amendment to amend the drawing, and adding new drawing sheets/figures, in order to comply with the Examiner's directives set forth at paragraph 2 of the outstanding Office Action.

Applicant believes that after the amendments to the claims, amendments to the drawings, and the amendments to the specification, that the claims, specification and drawings now comply with good patent practice. Accordingly, applicant respectfully request that withdrawal of the drawing objections and rejection of claims 1-4 and 8 under 35 USC § 112, second paragraph.

Finally, applicant thanks the Examiner for the indication of the allowable subject matter of claims 5-7, but has opted to argue the merits of the patentability of claim 1 from which claims 5-7 depend.

## Response To Rejections Under 35 USC § 102(b)

Claims 1-4, 8 and 9 were rejected under 35 USC § 102(b) as unpatentable over Comely, as set forth in paragraph 4 of the outstanding office action.

While the Examiner sets forth that Cesmeli discloses a method for visualizing perfusion of an organ, and includes each of the elements set forth in applicant's rejected claims, applicant respectfully disagrees.

Applicant's independent claims 1, 8 and 9 set forth that the inventive process and system display a fixed position in space, by registering each image frame in a sequence of image frames showing a region of interest under perfusion investigation, by implementing a transformation operation upon the organ portion in the region of interest (during perfusion measurement), such that the fixed organ position is aligned in every image of a series of images, with minimal motion artefacts, while perfusion characteristics are measured.

Cesmeli is directed to an imaging process used to investigate the integrity of a heart valve. Cesmeli is not concerned with a perfusion measurement of an organ, or even a perfusion measure (or blood flow measurement) through the valve. Still less does Cesmeli teach or suggest conducting a transformation operation of a series of images to continuously observe a fixed position in an organ, while concurrently implanting a perfusion measurement process.

Accordingly, applicant respectfully asserts that independent claims 1, 8 and 9 are patentably distinct from Cesmeli under 102(b), and requests withdrawal of the rejections thereto.

Moreover, claims 2-7 depend from claim 1, and are patentable as well for at least the reasons set forth for the patentability of claim 1 in view of Cesmeli, and, therefore, respectfully requests withdrawal of the rejections of claims 2-7 under 102(b) in view of Cesmeli.

Conclusion:

Applicant requests that Examiner Lu call the undersigned to discuss any aspect of the case, particularly if doing so may further prosecution, allowance, and passage to issue of the application, including pending claims 1-9.

Respectfully submitted,

By 

John F. Vodopia (36,299)  
Attorney for Applicant  
(914) 333-9627



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Filed: December 11, 2001

Ex. Tom Y Lu

Title: METHOD OF VISUALIZING THE PERFUSION OF AN ORGAN WHILE  
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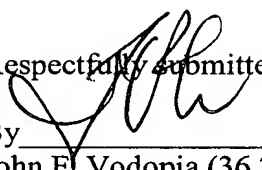
PETITION FOR EXTENSION OF TIME

Sir:

Applicant hereby petitions for an extension of ONE (1) month to respond to the OFFICE ACTION mailed on November 30, 2004. The extension extends the time period for response up to March 30, 2005.

Please charge Deposit Account No. 14-1270 in the amount of \$130, the fee for this extension; and charge any additional fees, except for the Issue Fee, and credit any overpayment, to Deposit Account No. 14-1270.

Respectfully submitted,

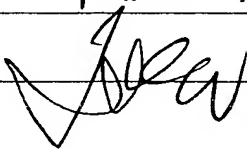
By   
John F. Vodopia (36,299)  
Attorney for Applicant  
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On March 30, 2005

By 

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1022V

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Atty. Docket

MARCEL BREEUWER

NL 000693

Serial No. 10/014,184

Group Art Unit: 2621

Filed: December 11, 2001

Ex. Tom Y Lu

Title: METHOD OF VISUALIZING THE PERFUSION OF AN ORGAN WHILE  
UTILIZING A PERFUSION MEASUREMENT

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

REQUEST TO MAKE DRAWING AMENDMENTS


Sir:

Enclosed are two copies of amended drawing sheet which includes Fig. 1. Applicant has amended Fig. 1 to show suggested drawing corrections in accordance with the Examiner's comments at paragraph 2 of the outstanding Office Action. Applicant has also added a new Fig. 4 to the sheet which originally showed only Fig. 1, which depicts a data processing system for implementing the method of the present invention. The drawing corrections (amendments) to the sheet containing Fig. 1 and newly presented Fig. 4 are marked in red ink. No new matter has been added.

Sheets 2 and 3 are now presented with the changes to the original drawing sheet. Sheet 2 depicts Fig. 2, which figure shows and identifies a region of interest (ROI) in an image, the ROI showing a organ of interest, including right and left ventricle planar slices through the myocardium. Sheet 3 includes newly presented Fig. 3 which shows a series of images as displayed, in different points in a time series of images of an organ within an ROI under perfusion investigation.

Approval of the drawing corrections is respectfully requested.

Respectfully submitted,

By:   
John H. Vodopia, Reg. 36,299  
Attorney for Applicant  
(914) 333-9627

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~~1/1~~  
1/3

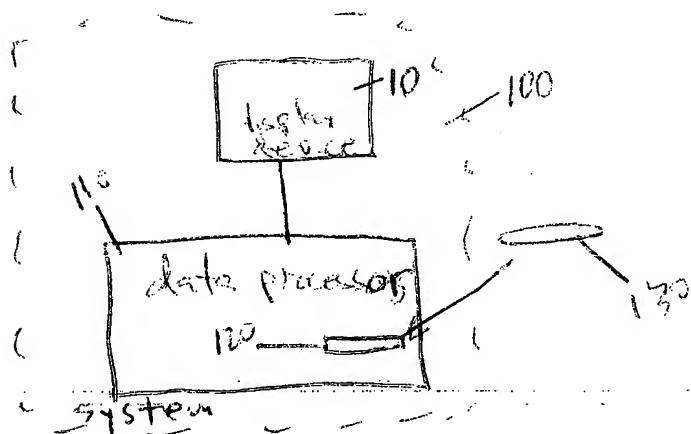
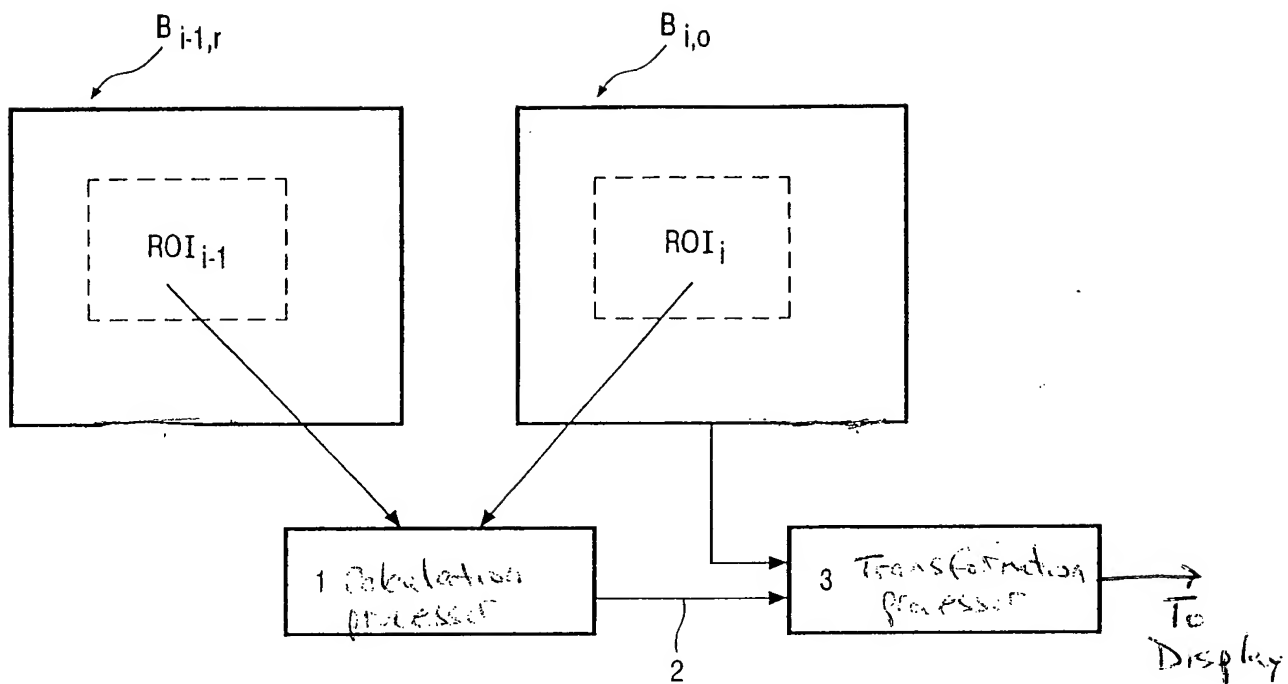


Fig. 1

Fig 4

ROI<sub>0</sub> i.e. region of interest in image 0

$B_{0,0}$  i.e. the unregistered,  
 "original" version of  
 image 0, i.e. the image  
 at temporal position 0  
 in the image series

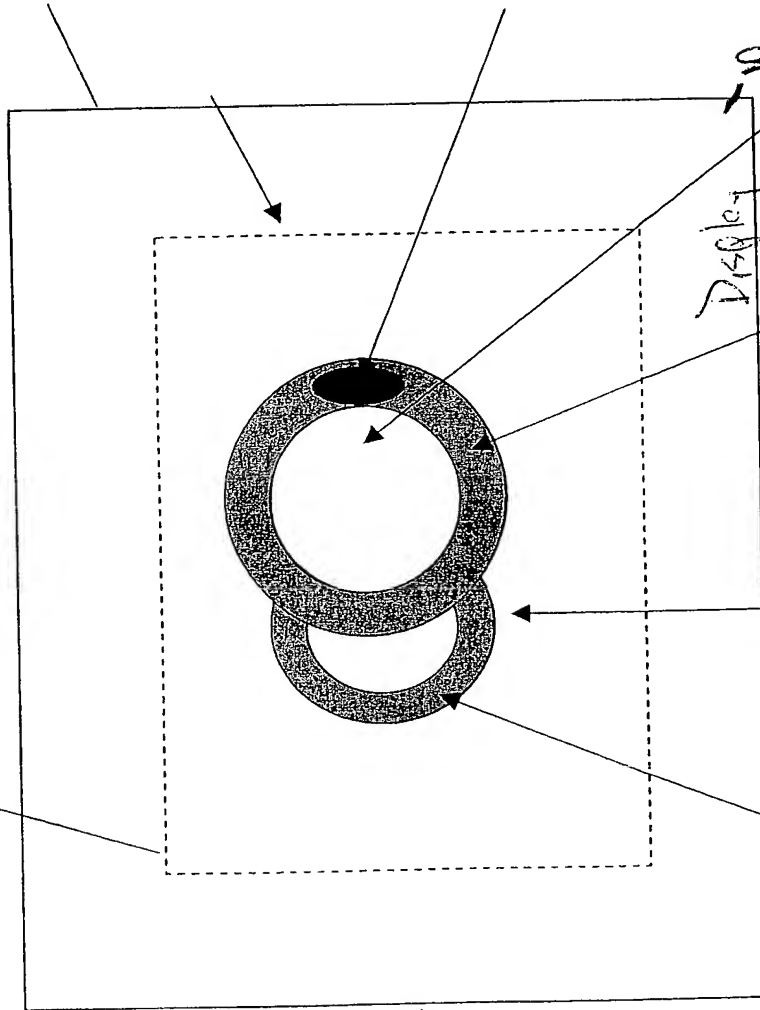
myocardial—<sup>20</sup>  
 area with  
 reduced  
 perfusion

left  
 ventricle  
 blood pool<sup>30</sup>

left  
 ventricle  
 myocardium<sup>40</sup>

right  
 ventricle  
 myocardium<sup>30</sup>

short-axis  
 slice through  
 the heart (cavity)



from  
 transformation  
 process

Fig 2



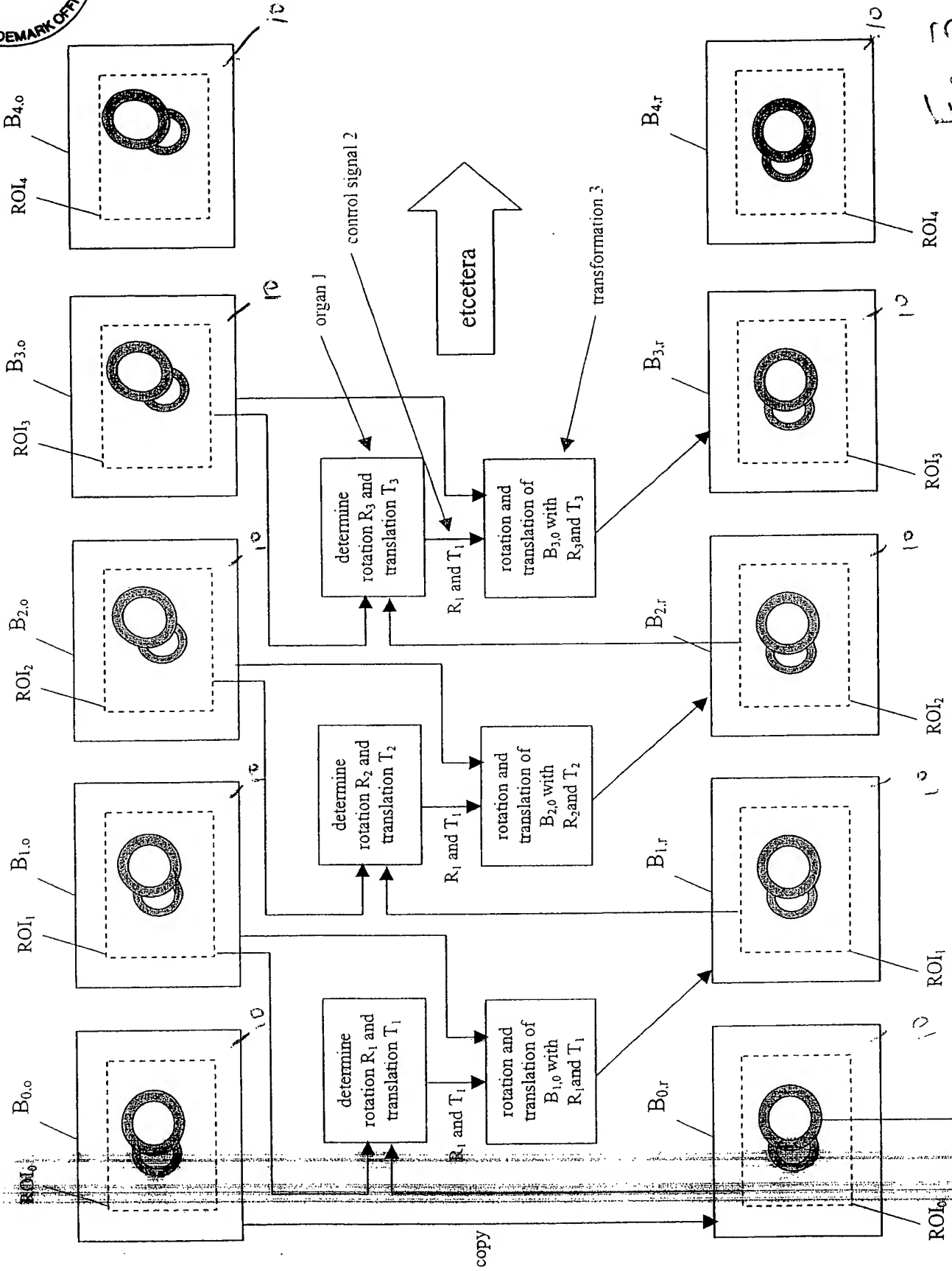


Fig 3

5/3

See figure on previous page



DOCKET NO. PL-000693 DIV. 10/014,187 SER. NO. 10/014,187

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Application ..... ☐ Amendment ..... ☒  
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3 No. Sheets (X.2) For. .... ☐ Assignment ..... ☐  
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